A wall cleaner structure hung by a cable and adapted to wash a wall surface includes a frame; a cleaning device for washing the wall surface; a suction device for drawing in a liquid having been used in washing the wall surface; and a collection device for collecting the liquid. The wall cleaner structure washes the wall surface in an automated manner, prevents accidents, and prevents waste liquid from flowing downward across the wall surface or even falling to the ground.
FIG. 2
WALL CLEANER STRUCTURE

FIELD OF TECHNOLOGY

[0001] The present invention relates to wall cleaner structures, and more particularly, to a wall cleaner structure for washing a wall surface automatically.

BACKGROUND

[0002] The prior art for use in cleaning the external walls of a building entails carrying out a wall cleaning process by hand. The manual wall cleaning process involves mounting a simple hanging structure at the top of the building, attaching a movable wall cleaning platform to the hanging structure, and eventually cleaning the external walls of the building by a wall cleaning worker working on the movable wall cleaning platform.

[0003] The conventional wall cleaning platform serves the following purposes: an elevation cable, a detergent, and a brush are positioned on the conventional wall cleaning platform; and a hose extends from the top floor to the wall cleaning platform, such that the wall cleaning worker can clean the external walls of the building with water sprayed out of the hose.

[0004] Normally, the conventional hanging structure can be moved along a rail fixed to the top floor of the building and thus cannot be uninstalled. Furthermore, even if the wall cleaning platform is not in use, the conventional hanging structure will remain on the top floor of the building and thus will be exposed to rainfall and sunshine; as a result, the conventional hanging structure is likely to rot or rust.

[0005] Furthermore, the wall cleaning platform is usually separated from the adjacent external wall of the building by a distance, and thus the wall cleaning worker has to clean the adjacent external wall of the building, using a brush with a long handle. Cleaning an external wall of a building with a long-handle brush is not only time-consuming and laborious but also proves ineffective in cleaning a specially-located external wall or an external wall of a special shape.

[0006] The aforesaid conventional wall cleaning process is preceded by a wall cleaning platform moving process that requires the wall cleaning worker to manually control the elevation cable for moving the wall cleaning platform vertically. It is not uncommon for the wall cleaning platform moving process to be hazardous. For example, the wall cleaning worker working on the wall cleaning platform is likely to trip or even fall off the wall cleaning platform because the wall cleaning platform moving vertically shakes or because the detergent or water wets the wall cleaning platform. Furthermore, the elevation cable is likely to be splashed with the detergent or water and thus develops a short circuit to thereby end up with a failure.

[0007] Accordingly, it is imperative to devise a wall cleaner structure for cleaning an external wall of a building in an automated manner with a view to preventing an accident from happening to wall cleaning workers and pedestrians and preventing the wall cleaning liquid (including water and a detergent) from spreading downward across the wall surface to reach the ground or even falling to the ground directly.

SUMMARY

[0008] It is an objective of the present invention to provide a wall cleaner structure for washing a wall surface automatically so as to prevent a wall cleaning worker from working in a hazardous workplace and thereby prevent a work accident from happening to the wall cleaning worker and pedestrians.

[0009] Another objective of the present invention is to prevent a wall cleaning liquid from spreading downward across the wall surface to reach the ground or even falling to the ground directly.

[0010] In order to achieve the above and other objectives, the present invention provides a wall cleaner structure hung by a cable and adapted to wash a wall surface. The wall cleaner structure comprises a frame, a cleaning device, a suction device, a drain flush, and a collection device. The frame and the cable are connected.

[0011] The cleaning device is disposed inside the frame and faces the wall surface. The cleaning device comprises: at least a spraying member for spraying a liquid onto the wall surface; at least a cleaning member lying horizontally above or beneath the spraying member; a collector disposed on a side of the at least a spraying member and a side of the at least a cleaning member, wherein the side of the at least a spraying member and the side of the at least a cleaning member face away from the wall surface; and three barrier members disposed at a periphery of the cleaning device and positioned at a top portion of the cleaning device, a leftward portion of the cleaning device, and a rightward portion of the cleaning device, respectively.

[0012] The suction device is disposed at the frame and comprises: a first suction member disposed above the cleaning device; a second suction member disposed to the left of the cleaning device; a third suction member disposed to the right of the cleaning device; a fourth suction member disposed beneath the cleaning device and having a drain outlet connected to the bottom of the collector; and a suction fan disposed on a side of the collector, connected to the first suction member, the second suction member, the third suction member, and the fourth suction member, and having a spray vent, wherein the suction fan-disposed side of the collector faces away from the wall surface.

[0013] The collection device is disposed beneath the cleaning device and having a collection outlet and a collection inlet connected to the bottom of the fourth suction member.

[0014] As regards the wall cleaner structure of the present invention, the spraying members are in the number of two, wherein the cleaning members are in the number of two and are disposed above and beneath the spraying members.

[0015] As regards the wall cleaner structure of the present invention, the cleaning members are roller brushes.

[0016] As regards the wall cleaner structure of the present invention, the barrier members are brushes.

[0017] As regards the wall cleaner structure of the present invention, the spray vent is disposed on a side of the frame and lies parallel to the wall surface, wherein the spray vent-disposed side of the frame faces away from the wall surface.

[0018] The wall cleaner structure of the present invention further comprises at least a pressurization device disposed at the frame and having a pressurized inlet and a pressurized outlet, the pressurized inlet being disposed on any side of the frame as long as the pressurized inlet-disposed side of the frame is perpendicular to the wall surface, and the pressurized outlet being disposed on a side of the frame and lying parallel to the wall surface, wherein the pressurized outlet-disposed side of the frame faces away from the wall surface. Furthermore, the pressurization device is in the number of four.
posed at the frame, facing the wall surface, and comprising a collision avoidance roller and a collision avoidance extendable rod. The collision avoidance extendable rod is connected to the collision avoidance roller. Furthermore, the collision avoidance rollers are in the number of four.

[0020] The wall cleaner structure of the present invention further comprises a drain brush disposed between the cleaning device and the first suction member. The drain brush further comprises a drain brush extendable rod for controlling the extension and retraction of the drain brush.

[0021] As regards the wall cleaner structure of the present invention, at least one of the first suction member, the second suction member, and the third suction member comprises a baffling panel.

[0022] The wall cleaner structure of the present invention further comprises a plurality of rollers disposed at the bottom of the frame.

[0023] In conclusion, the wall cleaner structure provided by the present invention is capable of washing a wall surface automatically so as to prevent an accident from happening to a wall cleaning worker and pedestrians and prevent the wall cleaning worker from working in a hazardous workplace and thereby prevent a work accident from happening to the wall cleaning worker and the pedestrians.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] Objectives, features, and advantages of the present invention are hereunder illustrated with specific embodiments in conjunction with the accompanying drawings, in which:

[0025] FIG. 1 is a schematic view of a wall cleaner structure according to the present invention;

[0026] FIG. 2 is a schematic view of the wall cleaner structure taken from another view angle according to the present invention;

[0027] FIG. 3 is a cross-sectional view of the wall cleaner structure according to the present invention;

[0028] FIG. 4 is a top view of the wall cleaner structure according to the present invention;

[0029] FIG. 5A is a lateral view of the wall cleaner structure with a collision avoidance device protruding therefrom according to the present invention;

[0030] FIG. 5B is a schematic view of the wall cleaner structure with the collision avoidance device protruding therefrom according to the present invention;

[0031] FIG. 6A is a lateral view of the wall cleaner structure with the collision avoidance device retracted according to the present invention; and

[0032] FIG. 6B is a schematic view of the wall cleaner structure with the collision avoidance device retracted according to the present invention.

DETAILED DESCRIPTION

[0033] Referring to FIG. 1 through FIG. 4, there are shown diagrams of a wall cleaner structure of the present invention. The wall cleaner structure 100 is hung by a cable 1 and adapted to wash a wall surface W (as shown in FIG. 4.) The wall cleaner structure 100 comprises a frame 10, a cleaning device 20, a suction device 30, a drain brush 40, and a collection device 50. The top of the frame 10 is connected to the cable and hung by a hanging structure (not shown).

[0034] Referring to FIG. 1 and FIG. 3, the cleaning device 20 is disposed inside the frame 10, and the cleaning device 20 faces the wall surface W. The cleaning device 20 comprises at least a spraying member 21, at least a cleaning member 22, a collector 23, and three barrier members 24.

[0035] The at least a spraying member 21 sprays onto a wall surface a liquid, such as water, a detergent, or a polishing agent. In an embodiment of the present invention, the at least a spraying member 21 are in the number of two, and the two spraying members 21 spray water and the detergent, respectively. The water and the detergent, which are stored either inside the frame 10 or on the top floor of the building, are delivered to the spraying members 21 by means of a pipeline.

[0036] In an embodiment of the present invention, the at least a cleaning member 22 comes in the form of two roller brushes, and the cleaning members 22 lie horizontally above and beneath the spraying members 21, respectively. Furthermore, it is also feasible that the cleaning member 22 is in the number of one and is disposed above or beneath the spraying members 21.

[0037] The collector 23 is disposed on one side of the spraying members 21 and one side of the cleaning members 22, wherein the one side of the spraying members 21 and one side of the cleaning members 22 face away from the wall surface W. The collector 23 collects the liquid guided by the cleaning members 22.

[0038] Referring to FIG. 1, the barrier members 24 are disposed at the periphery of the cleaning device 20, and more particularly, at the top portion, the leftward portion, and the rightward portion of the cleaning device 20, respectively, to reduce the chance that the wall surface-washing liquid splashes out of the cleaning device 20. In an embodiment of the present invention, the barrier members 24 are brushes.

[0039] The suction device 30 is disposed at the frame. The suction device 30 comprises a first suction member 31, a second suction member 32, a third suction member 33, a fourth suction member 34, and a suction fan 35. The first suction member 31 is disposed above the cleaning device 20. The second suction member 32 is disposed to the left of the cleaning device 20. The third suction member 33 is disposed to the right of the cleaning device 20. The fourth suction member 34 is disposed beneath the cleaning device 20. The suction fan 35 is disposed on one side of the collector 23, wherein the side of the collector 23 faces away from the wall surface W. The fourth suction member 34 has a drain outlet 341 connected to the bottom of the collector 23. Furthermore, the suction fan 35 is connected to the first suction member 31, the second suction member 32, the third suction member 33, and the fourth suction member 34. The suction fan 35 has a spray vent 351. The liquid splashing out of the cleaning device 20 is drawn into the suction fan 35 via the first suction member 31, the second suction member 32, the third suction member 33, and the fourth suction member 34, and then the liquid is atomized by the spray vent 351 and discharged therefrom.

[0040] Furthermore, referring to FIG. 2 through FIG. 4, the spray vent 351 is not only disposed on one side of the frame 10 but also lies parallel to the wall surface W, wherein the spray vent-disposed side of the frame 10 faces away from the wall surface W. Hence, the spray vent 351 gives a thrust to the frame 10, such that the wall cleaner structure 100 is unlikely to sway under a gust of wind while washing the wall surface W.

[0041] The wall cleaner structure 100 further comprises at least a pressurization device 60 for giving a thrust to the frame 10. In an embodiment of the present invention, the wall
cleaner structure 100 comes with four pressurization devices 60. The pressurization devices 60 each have a pressurized inlet 61 and a pressurized outlet 62. The pressurized inlets 61 can be disposed on any side of the frame 10, provided that the pressurized inlet-disposed side of the frame 10 is perpendicular to the wall surface W. The pressurized outlets 62 are disposed on one side of the frame 10 and lie parallel to the wall surface W, wherein the pressurized outlet-disposed side of the frame 10 faces away from the wall surface W. Hence, the pressurized inlets 61 of the pressurization devices 60 stabilize the frame 10 in the direction parallel to the wall surface W, whereas the pressurized outlets 62 of the pressurization devices 60 give a thrust to the frame 10 to thereby enable the frame 10 to get close to the wall surface W, thereby enhancing the efficiency of washing the wall surface W with the cleaning device 20 and preventing the frame 10 from swinging.

[0042] Referring to FIG. 1 and FIG. 3, the collection device 50 is disposed beneath the cleaning device 20. The collection device 50 has a collection inlet 51 and a collection outlet 52. The collection inlet 51 is connected to the bottom of the fourth suction member 34. Hence, most of the liquid drawn into the fourth suction member 34 is delivered to the collection device 50, such that the liquid for washing the wall surface is unlikely to fall to the ground.

[0043] A process of controlling the wall cleaner structure 100 to wash the wall surface W of a building involves: hanging the frame 10 with the cable 1; moving the frame 10 to the wall surface W; spraying the detergent onto the wall surface W with the spraying members 21 and from the ground to the top floor of the building; spraying water onto the wall surface W with the spraying members 21 and from the top floor of the building to the ground while washing the wall surface W with the cleaning members 22 and from the top floor of the building to the ground. The cleaning members 22 above the spraying members 21 rotate anticlockwise while washing the wall surface W. The cleaning members 22 beneath the spraying members 21 rotate clockwise while washing the wall surface W.

[0044] During the process of washing the wall surface W with the cleaning members 22, the used liquid (hereinafter referred to as the waste liquid) is guided to the collector 23. Most of the waste liquid guided to the collector 23 is delivered to the collection device 50 via the drain outlet 341 and the collection inlet 51. A waste management tube (not shown) installed at the collection outlet 52 guides the waste liquid to the ground to thereby prevent the waste liquid from falling to the ground. If the waste liquid is not guided by the cleaning members 22 to the collector 23 but flows downward across the wall surface W, the fourth suction member 34 will attract the waste liquid and thereby prevent the waste liquid from flowing downward across the wall surface W. Referring to FIG. 3, once the waste liquid is drawn into the fourth suction member 34, most of the waste liquid will be guided to the collection inlet 51, whereas the remaining waste liquid will be drawn into the suction fan 35 and then atomized by the spray vent 351 and discharged therefrom.

[0045] Furthermore, during the process of washing the wall surface W with the wall cleaner structure 100, a small amount of the waste liquid is neither guided to the collector 23 nor drawn into the fourth suction member 34. To cope with this problem, the barrier members 24, the first suction member 31, the second suction member 32, and the third suction member 33 together prevent the small amount of the waste liquid from falling to the ground. To this end, the barrier members 24 stop most of the liquid waste from splashing out of the cleaning device 20. Although a small amount of the liquid waste does splash out of the cleaning device 20, it is eventually drawn into the suction fan 35 via the first suction member 31, the second suction member 32, and the third suction member 33 and then atomized by the spray vent 351 before being discharged therefrom.

[0046] In conclusion, a wall cleaner structure of the present invention washes a wall surface in an automated manner, prevents accidents, and prevents waste liquid from flowing downward across the wall surface or even falling to the ground.

[0047] However, once the wall cleaner structure 100 is lifted or lowered to an intended point of a wall surface to be washed, the wall cleaner structure 100 will be separated from the wall surface W by a distance. At this point in time, if the wall cleaner structure 100 is moved horizontally to approach the wall surface W, the wall cleaner structure 100 will hit the wall surface W and get damaged. In view of this, the wall cleaner structure 100 further comprises at least a collision avoidance device 70 for preventing the wall cleaner structure 100 from hitting the wall surface W.

[0048] The wall cleaner structure 100 of the present invention further comprises four collision avoidance devices 70 each comprising a collision avoidance roller 71 and a collision avoidance extendable rod 72 connected to the collision avoidance roller 71. The collision avoidance devices 70 are disposed at the frame 10 and face the wall surface W. Referring to FIG. 5A and FIG. 5B, if the wall cleaner structure 100 approaches the wall surface W, the collision avoidance roller 71 will pop out by means of the collision avoidance extendable rod 72. The resilience of the collision avoidance roller 71 prevents the wall cleaner structure 100 from hitting the wall surface W. Referring to FIG. 6A and FIG. 6B, if the cleaning members 22 comes into contact with the wall surface W, the collision avoidance devices 70 will retract gradually, and the wall surface washing process will begin.

[0049] Referring to FIG. 5B and FIG. 6B, the wall cleaner structure 100 further comprises a drain brush 40. The drain brush 40 is disposed between the cleaning device 20 and the first suction member 31. If the waste liquid splashed out of the barrier members 24 remains on the wall surface W, the drain brush 40 will swing vertically to brush the residual waste liquid into the first suction member 31 or will brush the residual waste liquid off the wall surface W to allow the residual waste liquid to be drawn into the fourth suction member 34, thereby keeping the wall surface W clean. Furthermore, the drain brush 40 further comprises a drain brush extendable rod 41 connected to the frame 10 for controlling the extension and retraction of the drain brush 40. After the cleaning members 22 have come into contact with the wall surface W, chances are that the drain brush 40 has not yet come into contact with the wall surface W. To cope with this problem, the drain brush extendable rod 41 controls the position of the drain brush 40 in a manner that the drain brush 40 brushes efficiently into the first suction member 31 the waste liquid splashed out of the cleaning device 20.

[0050] Furthermore, referring to FIG. 3, FIG. 5B, and FIG. 6B, at least one of the first suction member 31, the second suction member 32, and the third suction member 33 further comprises a baffling panel 36 for controlling the degree of suction strength of the first suction member 31, the second suction member 32, and the third suction member 33. For
example, if the waste liquid is affected by a gust of wind and thereby splashed out of the cleaning device 20 solely in the direction of the third suction member 33, the baffling panel 36 will hide the second suction member 32 such that the suction provided by the suction fan 35 is restricted to the first suction member 31, the third suction member 33, and the fourth suction member 34. Accordingly, any one of the suction members can have its suction strengthened as needed.

[0051] Referring to FIG. 1 again, the wall cleaner structure 100 further comprises a plurality of rollers 80 conductive to shipping and moving the wall cleaner structure 100.

[0052] In conclusion, the wall cleaner structure provided by the present invention is capable of washing a wall surface automatically so as to prevent an accident from happening to a wall cleaning worker and pedestrians and prevent the wall cleaning worker from working in a hazardous workplace and thereby prevent a work accident from happening to the wall cleaning worker and the pedestrians.

[0053] The present invention is disclosed above by preferred embodiments. However, persons skilled in the art should understand that the preferred embodiments are illustrative of the present invention only, but should not be interpreted as restrictive of the scope of the present invention. Hence, all equivalent modifications and replacements made to the aforesaid embodiments should fall within the scope of the present invention. Accordingly, the legal protection for the present invention should be defined by the appended claims.

What is claimed is:

1. A wall cleaner structure hung by a cable and adapted to wash a wall surface, the wall cleaner structure comprising: a frame connected to the cable; a cleaning device disposed inside the frame and facing the wall surface, the cleaning device comprising: at least a spraying member for spraying a liquid onto the wall surface; at least a cleaning member lying horizontally above or beneath the spraying member; a collector disposed on a side of the at least a spraying member and a side of the at least a cleaning member, wherein the side of the at least a spraying member and the side of the at least a cleaning member face away from the wall surface; and three barrier members disposed at a periphery of the cleaning device and positioned at a top portion of the cleaning device, a leftward portion of the cleaning device, and a rightward portion of the cleaning device, respectively;

a suction device disposed at the frame and comprising: a first suction member disposed above the cleaning device; a second suction member disposed to the left of the cleaning device; a third suction member disposed to the right of the cleaning device; a fourth suction member disposed beneath the cleaning device and having a drain outlet connected to a bottom of the collector; and a suction fan disposed on a side of the collector, connected to the first suction member, the second suction member, the third suction member, and the fourth suction member; and having a spray vent, wherein the suction fan-disposed side of the collector faces away from the wall surface; and a collection device disposed beneath the cleaning device and having a collection outlet and a collection inlet connected to a bottom of the fourth suction member.

2. The wall cleaner structure of claim 1, wherein the spraying members are in the number of two, wherein the cleaning members are in the number of two and are disposed above and beneath the spraying members.

3. The wall cleaner structure of claim 1, wherein the cleaning members are roller brushes.

4. The wall cleaner structure of claim 2, wherein the cleaning members are roller brushes.

5. The wall cleaner structure of claim 1, wherein the barrier members are brushes.

6. The wall cleaner structure of claim 1, wherein the spray vent is disposed on a side of the frame and lies parallel to the wall surface, wherein the spray vent-disposed side of the frame faces away from the wall surface.

7. The wall cleaner structure of claim 1, further comprising at least a pressurization device disposed at the frame and having a pressurized inlet and a pressurized outlet, the pressurized inlet being disposed on any side of the frame as long as the pressurized inlet-disposed side of the frame is perpendicular to the wall surface, and the pressurized outlet being disposed on a side of the frame and lying parallel to the wall surface, wherein the pressurized outlet-disposed side of the frame faces away from the wall surface.

8. The wall cleaner structure of claim 7, wherein the pressurization devices are in the number of four.

9. The wall cleaner structure of claim 1, further comprising at least a collision avoidance device disposed at the frame, facing the wall surface, and comprising a collision avoidance roller and a collision avoidance extendable rod for controlling extension and retraction of the collision avoidance roller.

10. The wall cleaner structure of claim 9, wherein the collision avoidance devices are in the number of four.

11. The wall cleaner structure of claim 1, further comprising a drain brush disposed between the cleaning device and the first suction member.

12. The wall cleaner structure of claim 11, wherein the drain brush further comprises a drain brush extendable rod for controlling extension and retraction of the drain brush.

13. The wall cleaner structure of claim 1, wherein at least one of the first suction member, the second suction member, and the third suction member comprises a baffling panel.

14. The wall cleaner structure of claim 1, further comprising a plurality of rollers disposed at a bottom of the frame.

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